



Complete, fold and seal
(see note 2 below)

SURNAME: MACLEOD

FORENAME(S): RODINA

Examination Answer Books

12 Pages

Instructions to Candidates

1. Please give the information requested in the boxes below.
2. Enter your name in the space provided to the right, fold over and seal down (using the label provided) to hide your name.
3. The answers must be legibly written. The Examiners can either ignore illegible script or have it typed and the expense of typing charged to the candidate.
4. Write your answers in ink.
5. Begin each answer on a fresh page. Do all rough work in the answer book and cross it through.
6. No part of this book is to be torn out; it must be handed in complete.
7. If more books than one are used, fasten them together using the tags available from the invigilator(s).
8. **Every book must be handed in. In no circumstances may answer books, used or unused, be taken out of the examination venue.**

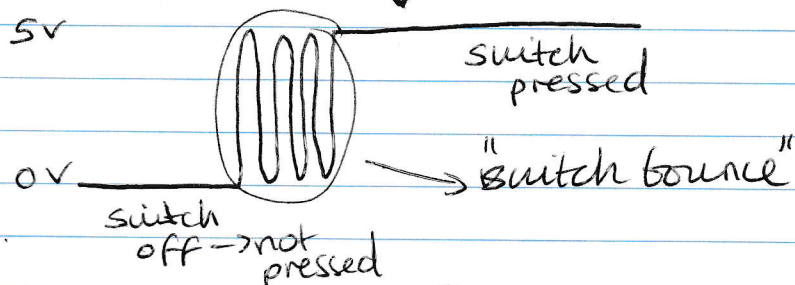
1	Student Number	2318127
2	Title of Examination Paper	MICROS PERIPHERALS & INTERFACES
3	Module Code	ACDA4004
4	Date and Time of Examination	08/01/25 09:00
5	Examination Venue	1Q310
6	Seat Number	012
7	Number of Answer Books handed in	

List the numbers of the questions you have attempted	Office Use
1	7½
2	5
3	3
4	2
5	9
6	3
	29½
	x2
	9
Total	59½

7½
5
3
2
9
3
29½

- Q1)
- a) RETURN - return from subroutine when process complete ✓ 1 1/2
 - b) SLEEP - sleep → pause routine with set time ✓ 1
 - c) ADDLW - add literal to the working register (W reg) ADDLW 0x10 ✓ 2
 - d) BCF f, b - bit clear file BCF PORTB, 0 ✓ 1
 - e) DECF - decrement f (file register) by 1 (-1) ✓ 2
- 7 1/2

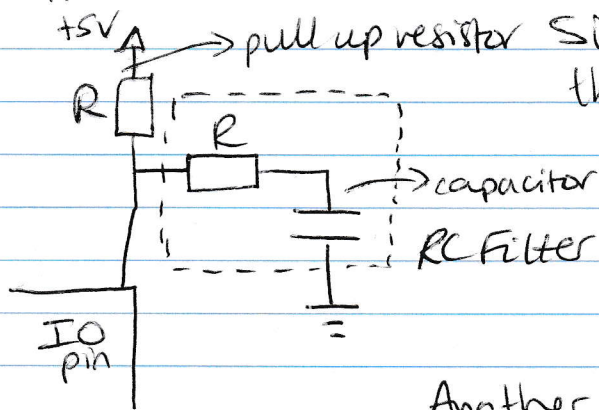
Q2) "Switch bounce" occurs when, for example, a switch is triggered / button is pressed and the electrical / metal elements are triggered as ON/OFF resulting in an incorrect signal



This can cause issues if the signal is falsely being interpreted as ON/OFF instead of one clean signal. In a circuit this could cause issues with processes which could result in other subsequent processes not functioning and resulting in a failed circuit.

Q2
cont.

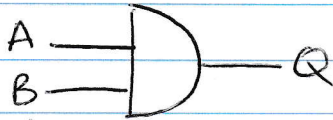
In order to mitigate this mechanical phenomena, an RC Filter could be included in the circuit to 'filter' out the



Signal and removing the switch bounce as the capacitor provides a steady voltage. This could be connected to the PIC microcontroller IO pin.

Another method to mitigate/reduce the occurrence of switch bounce would be to set a timer to delay the time between the switch/button being pressed.

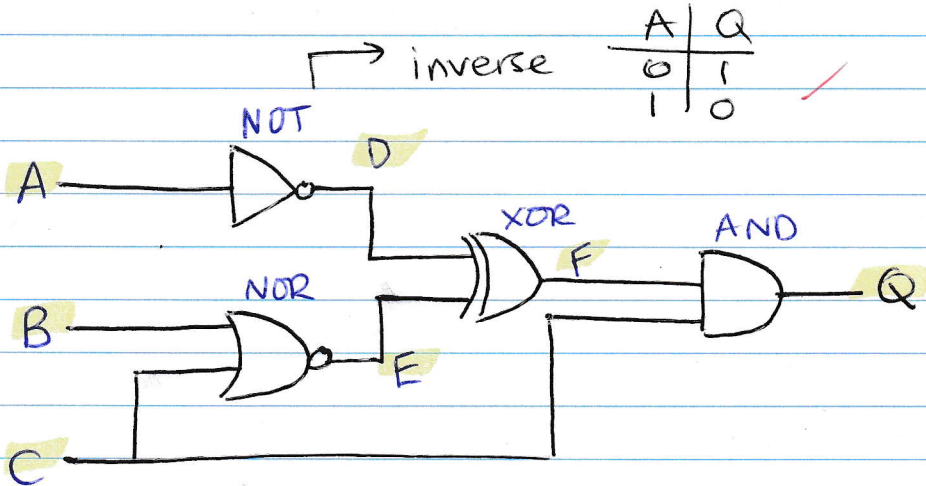
3) AND Gate



A	B	Q
0	0	0
0	1	0
1	0	0
1	1	1

A	Q
0	1
1	0

Q4)



A	B	Q
0	0	1
0	1	0
1	0	0
1	1	0

NOR

A	B	Q
0	0	1
0	1	0
1	0	0
1	1	0

XOR

A	B	Q
0	0	0
0	1	1
1	0	1
1	1	0

XNOR

A	B	Q
0	0	1
0	1	0
1	0	0
1	1	1

OR Gate

A	B	Q
0	0	0
0	1	1
1	0	1
1	1	1

B	C	~~NOR~~ E	(NOR)	(E)
0	0	1		
0	1	0		
1	0	0		
1	1	0		

D	E	F
1	1	0
0	0	0
0	0	0

A	D (inverse)
0	1
0	1
1	0
1	0

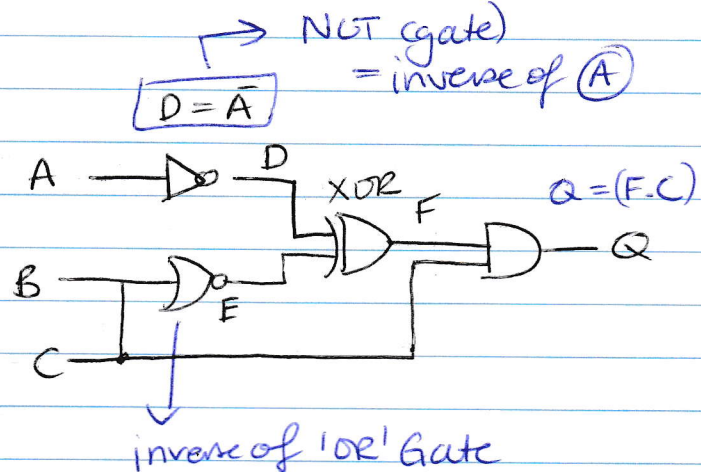
AND

F	C	Q
0	0	0
1	1	1
0	0	0
0	1	0

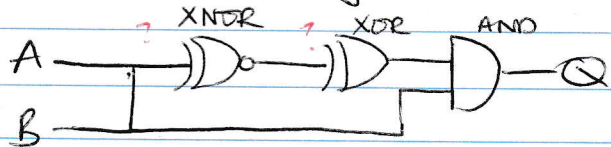
= Final output

For intermediate steps -

Q4
b)

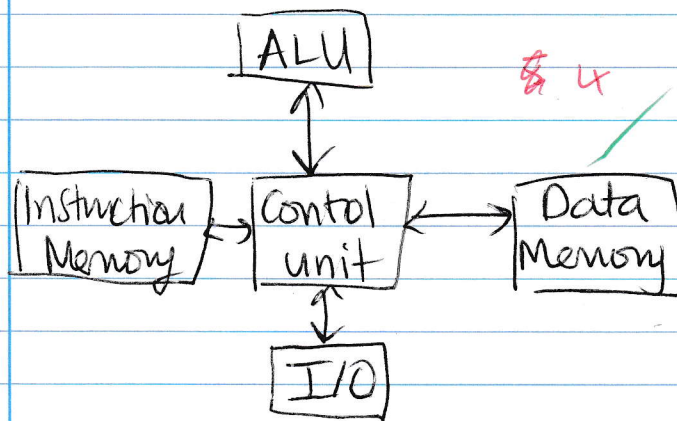


could combine NOT + NOR gate (XNOR)



Q5)

Harvard



- > Separate memory (more efficient CPU)

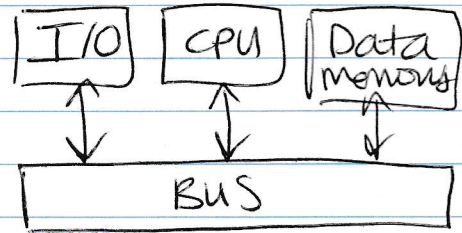
⊕ Advantages

- Faster, more efficient CPU
- can process data mem / I/O simultaneously

⊖ Disadvantages

- Less flexible memory partition
- requires more hardware

Von Neumann



- > Shared memory
- > More flexibility with memory

⊕ Advantages

- More flexible, simpler memory

⊖ Disadvantages

- Cannot access simultaneously
- Higher chance of corruption/errors

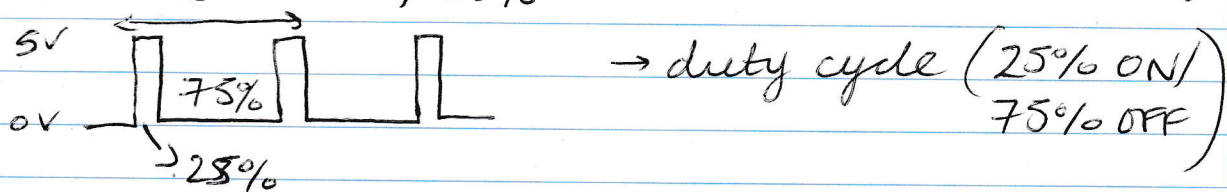
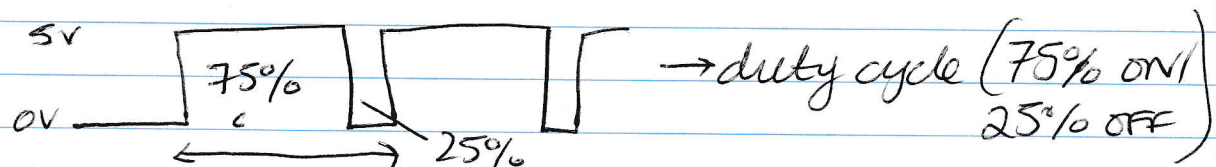
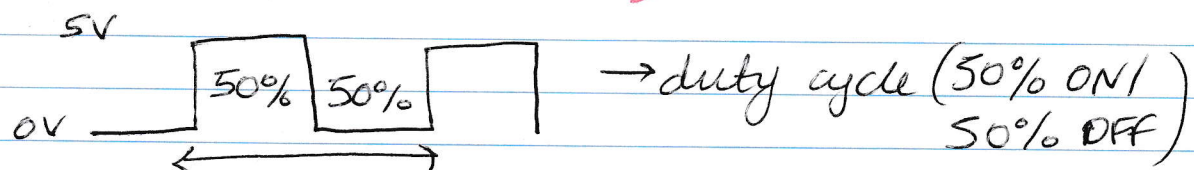
Q6)

PWM

Microcontrollers have an inbuilt hardware module named CCP (compare / PWM) + the PWM (Pulse Width Modulation) allows a digital signal to be used with analog devices.

The PWM digital signal uses 'duty cycles' to represent the time the pin is HIGH signal

for example;



To implement a simple DAC (Digital → Analog) converter by using a single microcontroller output pin to produce a PWM digital signal you configure the CCP Module → to PWM Mode, set the PIC output pin + use a timer to set the duty cycle.

